

# **Digital downloading jukebox system with central and local music servers**

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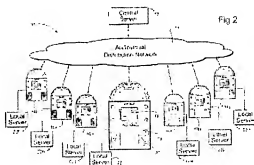
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## **Abstract of EP 1408427 (A2)**

A digital downloading jukebox system including a central server and a plurality of remote jukebox devices (16a-16f) each provided with a local server (22a-22f) that mirrors the central server and enables selected songs to be immediately downloaded to the jukebox device (16a-16f) for reproduction. The local server (22a-22f) and jukebox (6a-16f) also provide, through control of the central server (12), song download services to other jukebox devices, such as residential jukeboxes. The jukebox system also acts as a monitoring/management device for other coin operated equipment present in a location where the jukebox is located, thereby enabling the jukebox device (16a-16f) to perform updates on other equipment under control of the central server (12).



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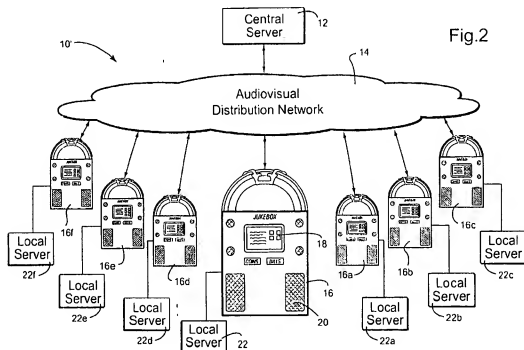
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### (54) Digital downloading jukebox system with central and local music servers

(57) A digital downloading jukebox system including a central server and a plurality of remote jukebox devices (16a-16f) each provided with a local server (22a-22f) that mirrors the central server and enables selected songs to be immediately downloaded to the jukebox device (16a-16f) for reproduction. The local server (22a-22f) and jukebox (6a-16f) also provide, through control

of the central server (12), song download services to other jukebox devices, such as residential jukeboxes. The jukebox system also acts as a monitoring/management device for other coin operated equipment present in a location where the jukebox is located, thereby enabling the jukebox device (16a-16f) to perform updates on other equipment under control of the central server (12).



## Description

### Field of the invention:

[0001] The instant invention relates to jukebox systems and, more particularly, to digital downloading jukebox systems of the type which include a central server and remote jukebox devices that communicate with the central server for royalty accounting and/or content updates. The instant invention improves such systems by providing a local server for each jukebox device in the jukebox system network. The local server provides a second and more expansive source of content (i.e., audio and/or visual data) that can be selected by a user of the jukebox device for reproduction on the jukebox device. The local servers preferably provide a mirror of the central server, thereby enabling the entire library of audio and/or visual data to be conveniently available to each jukebox device without the need to download requested content, that is not available on the mass storage device of the jukebox device itself, from the central server. The collective group of local servers also act as a network of distributed content servers that can be controlled by the central server through each jukebox device to provide services to other devices, such as residential jukebox devices. In addition, the jukebox device and local server can, under control of the central server, operate as a "central hub" or management device for all downloadable coin-operated equipment present in a location with the jukebox device.

### Background and Summary of the invention:

[0002] Jukeboxes have been around for decades and provide users with the ability to select desired music for reproduction in a convenient and advantageous manner. Jukeboxes have conventionally been provided in commercial establishments, such as restaurants and bars, in order to provide desired music on demand for patrons thereof for a fee. Over the last several years, a new generation of jukebox devices have become available that provide significant improvements in the operation thereof for all parties involved. More specifically, the conventional standalone phonorecord and CD jukeboxes are being replaced by digital downloading jukeboxes that are controlled by and communicate with a central server. An example of this new generation of jukebox system is shown in U.S. Patent No. 6,308,204, the disclosure of which is incorporated by reference herein in its entirety. A leading provider of this new generation of jukebox systems is TouchTunes Music Corporation, headquartered in Montreal, Canada.

[0003] Figure 1 shows an overview of an exemplary embodiment of a digital downloading jukebox system 10 (hereinafter referred to simply as a "jukebox system"). As shown in Figure 1, the jukebox system 10 includes a central server 12 that contains a master library of audio content (typically music), as well as or alternatively au-

diovisual content (typically music and associated video or graphics), that can be downloaded therefrom. The jukebox system also includes a series of remote jukebox devices 16, 16a-16f. Each of these jukebox devices are generally located in a bar, restaurant, club or other desired location, and are operable to play music in response to receiving a payment from a user, such as coins, bills, credit/debit card, etc., and having one or more songs selected by the user for play. The jukebox device 16 typically includes a screen 18 that presents information to the user and allows the user to select songs therefrom, as well as an audio system 20 that plays the selected songs. The screen 18 may also be used for displaying song-related video or graphics. The screen 18 may also be used to display advertisements for the jukebox itself in order to attract customers thereto, to display other types of advertisements and/or to display any other desired information.

[0004] The jukebox devices 16 (sometimes referred to as simply "jukeboxes" herein) are operable to communicate with the central server 12 through a communications network 14, such as the Internet. The jukeboxes 16 periodically communicate with the server 12 in order to provide information to the server 12 regarding the specific songs that have been played on the jukebox. The central server then uses this information in order to determine the appropriate royalties and/or other payments that are owed for songs played on each jukebox. Thus, one significant advantage of this new generation of jukeboxes is that the sound reproduction and/or other applicable music rights can be adhered to in a more accurate and reliable manner, thereby assuring the proper royalties are paid to the artists or music owners. The central server 12 can also provide new songs to the jukebox 16 in order to assure that the appropriate or most popular songs are maintained on the jukebox based on the specific customers at that location. Thus, the songs available on each jukebox can be customized through communication with the central server in order to provide the songs and/or types of music that customers generally request at each jukebox location. As described in the above-referenced '204 patent, the central server can also advantageously be used to update the operating software on the jukeboxes in order to, for example, change the operation of the jukebox, such as to provide new or improved features. Thus, another significant advantage of this new generation of jukeboxes is that the songs (or other audio and/or visual content), and the operation of the jukebox itself can be remotely changed as desired without the need to have someone (such as a routeman) personally service the jukebox. Instead, all such updates can be done using the central server 12.

[0005] As indicated above, the jukebox devices 16 each include a mass storage device, such as a hard drive, which stores the songs and associated video/graphics data (if any), as well as any other desired graphical information for reproduction on the jukebox.

The mass storage device of the jukebox typically has limited storage capacity relative to the storage device of the central server 12. As a result, only a fraction of the songs stored on the central server are actually stored on the mass storage device of the jukebox at any one time. There may be other reasons as well, such as for security of the data or limited room in the jukebox itself, for having limited storage capacity on the jukebox and/or limiting the number of songs stored thereon. For example, physical space may be limited on wall-mount jukeboxes or the like, which are designed to be small in sizes as compared to free standing models. As explained above, the songs on the jukebox can be changed through communication with the central server, but any one jukebox only stores a subset of the complete library of songs maintained by the central server at any one time.

[0006] In order to maximize the revenue that a jukebox generates it is important to make the most desired songs available on the jukebox over time. If customers cannot find songs they like on the jukebox, usage of the jukebox (and the revenue generated thereby) will dramatically decrease. On the other hand, it is impossible to predict in advance exactly what a customer at any particular location will desire to play on the jukebox. In fact, there are likely many instances where a customer would have selected a song that exists on the central server but is not currently present on the jukebox. As a result, the jukebox may not be enjoyed and used to its fullest extent. In order to address this problem and increase revenue, jukebox systems have in the past provided a feature which enables the user to search for songs on the central server from the jukebox and request an immediate download of a desired song from the central server to the jukebox for an additional fee. This feature enables the user to play any song in the master library of songs maintained by the central server using the jukebox, regardless of whether or not the specific song is presently stored in the mass storage of the jukebox itself. Thus, the user can first look for desired songs on the local storage of the jukebox and then, if desired, search further on the central server for desired songs. The jukebox device typically charges an additional fee (such as five credits instead on one credit) for an immediate download and play of a song from the central server as opposed to a standard play directly from the jukebox's local storage.

[0007] One problem, however, with the immediate downloading feature is that it requires an immediate and high speed connection with the central server to implement. In addition, the central server and network must be prepared to and capable of handling such requests in a reliable and efficient manner for the feature to properly operate. These requirements cannot always be met and, as a result, implementation of this feature has been limited. For example, many locations that have jukeboxes do not have high speed connections (such as DSL) and instead use dial-up modem connections. Jukebox-

es which rely on dial-up connections generally are only designed to communicate with the server periodically and do not allow the user to immediately download a song. They have, however, enabled a user to vote for a song to be downloaded at a later time when the dial-up connection is made. This, of course, is not as satisfying to the user as being able to immediately download a song. Other problems can arise in connection with this download feature if the network or server is not currently available for the download, due to traffic, malfunctions or the like.

[0008] For the reasons explained above, there is a need for a jukebox system that overcomes these and other disadvantages. The instant invention is designed to address these and other problems and to provide even further functionality for such jukebox systems.

[0009] In accordance with a primary object of the instant invention, a local content server is provided for each jukebox in the jukebox system. The local server preferably mirrors the master library of songs (and/or other content) on the central server. The local server is installed in close proximity to the jukebox to which it is assigned and preferably in the same restaurant or bar where the jukebox is installed. The local server may even be installed within the housing of the jukebox device itself if space permits. Preferably, however, the local server is simply installed in a convenient location and connected to the jukebox using Ethernet or the like. In accordance with the invention, the local server is used to implement the immediate downloading feature described above without the need for a high-speed connection with the central server. In other words, the user can first search the local storage on the jukebox for desired songs and then, if desired, search further on the local server for desired songs. If the desired song is found on the local storage it is played from the local storage for a normal fee. On the other hand, if the song is only found on the local server, the song can be immediately downloaded, at the option of the user, from the local server to the jukebox for playing for a fee that is preferably higher than the normal fee. As a result, the immediate downloading feature can be reliably implemented regardless of the connection type to the central server and regardless of the availability of the network or the central server. Moreover, the fact that the download comes from the local server rather than the central server is transparent to the user.

[0010] In accordance with another aspect of the invention, the local server is periodically updated with data (e.g., songs) to correspond with the contents of the master library of data (e.g., songs). The updating may occur remotely using dial-up or broadband connections, or it may be updated manually by, for example, an operator using an update tool provided by the entity controlling the jukebox system which can be directly connect to the jukebox or local server for the purpose of updating the local server so that the contents correspond to the master library on the central server.

[0011] In accordance with a preferred embodiment, the server includes an array of hard drives with associated IDE controller(s), a microprocessor, a flash memory containing the BIOS and the operating system, RAM and an Ethernet controller for communication with the jukebox. Each local server is preferably assigned or registered to the specific jukebox to which it is connected. For security purposes, the data on the local server preferably does not comprise any complete songs. Instead, the jukebox device includes missing data from each song on the local server, so that the jukebox can construct the entire song from the contents of its storage device and the contents of the local server. The data on the local server is also preferably encrypted using the missing data (e.g., one block), thereby preventing songs from being copied or played from the local server by any device other than the jukebox to which it is assigned.

[0012] In accordance with another aspect of the invention, the collection of local servers is used as a network of distributed servers which can be controlled by the central server to provide music services to other devices which are connectable to the network through which the central server and jukeboxes communicate. For example, the local servers and associated jukebox are used to deliver any requested song to a dedicated residential jukebox device (or other suitable jukebox device) in addition to providing song services to the specific jukebox to which it is connected and assigned.

[0013] In accordance with a further aspect of the invention, the local server and jukebox device are used, under control of the central server, to provide management services for other types of coin operated or payment triggered equipment, such as gaming devices, installed in the same location as the jukebox. In other words, the jukebox system is preferably used to update the functionality of and/or manage other downloading devices present in the same location. As a result, the jukebox becomes a "central hub" for all downloading equipment in a location. This feature is achieved, in one embodiment, by networking all of the downloading devices in a single location together with the jukebox and local file server. The central server can then download information to the local server together with instructions to the jukebox as to which devices should be updated with what data and/or software. The jukebox device and local server can also be used to collect information from the other downloading devices to which it is managing and upload that information to the central server for reporting/accounting purposes. Thus, the owner/operator of the jukebox system can act as a third party service provider to other coin-op companies for the purpose of managing and/or updating their equipment, such as electronic gaming equipment.

[0014] A first aim of the instant invention is to provide a jukebox system comprising:

a central server including a master library of content to be accessed;

a plurality of jukebox devices in communication with said central server, said jukebox devices providing access to said central server; and  
a plurality of local servers each being operably coupled to respective ones of said plurality of jukebox devices, and being in substantially close proximity to said respective ones of said plurality of jukebox devices, said local servers containing content that is not resident on said jukebox devices.

[0015] According to another feature, said local servers are periodically updated independently from said jukebox devices.

[0016] According to another feature, said local servers are updated from the central server via the jukebox device.

[0017] According to another feature, content available at the local server substantially mirrors content available at the central server at a given point in time.

[0018] According to another feature, said local server is in communication with a plurality of remote jukebox devices, said local server operating to selectively deliver content to said remote jukebox devices under control of the central server.

[0019] According to another feature, the jukebox system is further comprising:

a plurality of non-jukebox devices operably connected to said local server, said local server operating as a local central hub for managing said plurality of non-jukebox devices.

[0020] According to another feature, the jukebox system is further comprising:

at least one non-jukebox device being operably connected to at least one local server, said local server operating to manage said non-jukebox device.

[0021] According to another feature, the non-jukebox devices provide services in exchange for payment by a user.

[0022] According to another feature, a collection of selected local servers are arranged to provide a network of distributed servers operating under the control of the central server via at least one jukebox device to provide content and/or services to other devices.

[0023] According to another feature, said local server provides management services for equipment that is capable of downloading updated information.

[0024] According to another feature, the local server is connected to its respective jukebox device via a dedicated high-speed communications connection.

[0025] According to another feature, the dedicated high-speed communications connection is an Ethernet network.

[0026] According to another feature, the dedicated

high-speed communications connection operates at speeds at least as fast as an Ethernet network.

[0027] According to another feature, said local server is updated via an update tool.

[0028] According to another feature, content resident on said central server and said jukebox devices are compressed and encrypted according to a first encryption level.

[0029] According to another feature, content resident on said local servers is encrypted with a second layer of encryption.

[0030] According to another feature, content residing on said local servers are missing a predetermined number of bytes, said missing bytes being stored in a respective jukebox associated with a respective local server, said missing bytes being inserted into content received by a respective jukebox device from a respective local server.

[0031] According to another aspect of the invention, a jukebox system is comprising:

a central server;

a plurality of jukebox devices in communication with said central server for receiving content and updates from said central server; and

a local server in communication with at least one of said plurality of jukebox devices, said local server being arranged to provide content to said jukebox device.

[0032] According to another feature, said local server is located in substantially close proximity to said jukebox device and is connected to said jukebox device via a high-speed communication link.

[0033] According to another feature, said content provided by said local server to said jukebox device is based on selections made by a user operating the jukebox device.

[0034] According to another feature, the local server is periodically updated.

[0035] According to another feature, the content of the local server substantially mirrors the content of the central server at a given point in time.

[0036] According to another feature, content resident on said central server and said jukebox devices are compressed and encrypted according to a first encryption level.

[0037] According to another feature, content resident on said local servers is encrypted with a second layer of encryption.

[0038] According to another feature, content residing on said local servers are missing a predetermined number of bytes, said missing bytes being stored in a respective jukebox associated with a respective local server, said missing bytes being inserted into content received by a respective jukebox device from a respective local server.

[0039] Another aim of the invention is to provide a

method of operating a jukebox system comprising:

providing a plurality of services and content at a central repository;

connecting a plurality of jukebox devices to said content repository via a communications medium; connecting a local server to at least one of said plurality of jukebox devices, said local server being in substantially close proximity to said jukebox device to which it is connected;

providing access to content stored on the local server to a user via the jukebox device;

downloading a user selection from the local server to the jukebox device automatically or based on user action; and

playing or displaying content via the jukebox device.

[0040] According to another feature, the method is further comprising:

connecting a plurality of remote jukebox devices to the at least one local server, said local server operating to selectively deliver content to said remote jukebox devices under control of the central repository.

[0041] According to another feature, the method is further comprising:

connecting a plurality of non-jukebox devices to said local server, said local server arranged to operate as a central hub for managing said plurality of non-jukebox devices.

[0042] According to another feature, the method is further comprising:

connecting a collection of local servers to form a network of distributed servers operating under control of the central repository via at least one jukebox device to provide content to other devices.

[0043] According to another feature, the method is further comprising:

compressing content residing on said central server, said jukebox devices and said local servers; encrypting content residing on said central server and said jukebox devices at a first level of encryption; and

encrypting content residing on said local servers at a second level of encryption.

[0044] According to another feature, content residing on said local servers are missing a predetermined number of bytes, said missing bytes being stored on respective jukebox devices associated with respective local servers, the method further comprising:

inserting missing bytes into content received by a respective jukebox from a respective local server.

[0045] According to another feature, said missing bytes are inserted before playing or displaying said content.

[0046] According to another feature, said missing bytes are inserted in the content during play or display.

[0047] According to another aspect of the invention, a jukebox system is comprising:

a central server containing a plurality of compressed content files, said compressed content files being encrypted at a first encryption level; a plurality of jukebox devices in communication with said central server for receiving content and updates from said central server and containing a plurality of compressed content files encrypted at said first encryption level; and a local server in communication with at least one of said plurality of jukebox devices, said local server being arranged to provide content to said jukebox device, wherein content residing on said local server is encrypted at a second level of encryption.

[0048] According to another feature, content files residing on said local server are missing a predetermined number of bytes, said missing bytes being stored in a respective jukebox associated with said local server, said missing bytes being inserted into a content file received by said respective jukebox device from a respective local server.

[0049] According to another feature, decryption keys unique to each local server are communicated to a dedicated registered jukebox device.

[0050] According to another feature, the decryption keys are stored in a volatile memory.

[0051] Another aim of the invention is to provide a method of operating a jukebox system comprising:

providing a plurality of services and content at a central repository, said central repository including compressed content files that are encrypted at a first level of encryption; connecting a plurality of jukebox devices to said content repository via a communications medium, said jukebox devices containing compressed content files that are encrypted at said first level of encryption; connecting a local server to at least one of said plurality of jukebox devices, said local server being in substantially close proximity to said jukebox device to which it is connected, wherein content resident on said local server is encrypted with a second level of encryption; providing access to content stored on the local server to a user via the jukebox device; downloading a user selection from the local server

to the jukebox device based on user action; decrypting said user selection at said jukebox device; and playing or displaying user selected content via the jukebox device.

[0052] According to another feature, encrypted content files residing on said local server are missing a predetermined number of bytes, said missing bytes being stored on a jukebox device associated with said local server, the method further comprising:

inserting missing bytes into a content file received by the associated jukebox from its local server.

[0053] According to another feature, decryption keys unique to each local server are communicated to a dedicated registered jukebox device.

[0054] According to another feature, the decryption keys are stored in a volatile memory.

#### **Brief Description of the Drawings:**

[0055] These and other features, objects and advantages of the instant invention will be further understood by review of the following detailed description of the invention when read in conjunction with the appended drawings, in which:

Figure 1 is a block diagram of a conventional downloading digital jukebox system;

Figure 2 is a block diagram of the improved downloading digital jukebox system in accordance with a preferred embodiment of the instant invention;

Figure 3 is an exemplary screen shot showing an initial selection screen in accordance with a preferred embodiment of the jukebox system of the present invention;

Figure 4 is another screen shot showing an exemplary search screen for use in searching for songs on the local server in accordance with a preferred embodiment of the instant invention;

Figure 5 is another exemplary screen shot showing the results of a search on the local server and providing the user an option of downloading a desired song to the jukebox device for a fee, in accordance with a preferred embodiment of the instant invention;

Figure 6 is another exemplary screen shot showing an alternative method of allowing access to the downloading feature of the instant invention;

Figure 7 shows a block diagram of a preferred em-

bodiment of the local sever of the instant invention; and

Figure 8 shows a block diagram of an exemplary overall network including commercial jukeboxes and residential jukeboxes, as well as other downloading devices and associated connections that are managed by the jukebox system of the instant invention.

#### **Detailed Description of the Preferred Embodiments:**

[0056] Referring now to the drawings, Figure 2 shows a block diagram of the preferred embodiment of the improved jukebox system 10' of the instant invention. The jukebox system 10' includes similar elements as shown in Figure 1 and described above, including a central server 12, communications network 14, and remote jukebox devices 16, 16a-16f. However, in accordance with the instant invention, the jukebox system 10' further includes local servers 22, 22a-22f respectively connected to each of the jukebox devices 16, 16a-16f. The central server 12 includes a master library of songs (and/or other content). Each of the jukebox devices includes a subset of the master library on a local storage device of the jukebox. The central server is used to individually manage the contents of the jukebox device, by monitoring usage of and updating the subset of songs on each of the jukebox devices with the intent of maximizing the usage thereof. The central server 12 periodically receives data from each of the jukeboxes for the purpose of royalty accounting and payment for songs played. The jukebox devices may connect to the network in any suitable manner, such as dial-up modem or broadband modem (e.g., DSL, cable or satellite). The communications network 14 may be any suitable network capable of distributing data (e.g., audiovisual data) from the central server 12 to the jukeboxes 16 and enabling data to be uploaded from the jukeboxes 16 to the central server 12.

[0057] The songs (and/or other data) are preferably digitized, compressed and encrypted by the central server 12 prior to sending songs to the jukeboxes for security and bandwidth purposes using known techniques. The songs are then decompressed and decrypted by the jukeboxes for storage and reproduction thereon. Thus, each of the jukeboxes maintains a library of digitized songs for play on the jukebox, wherein the library can be changed or updated through communication by the central server. The jukeboxes preferably also receive and store data constituting images (e.g., still and/or moving video and/or graphical images) that can be displayed on the display 18 of the jukebox device 16. In one embodiment of the invention, the jukebox devices have the structure and operation described in the '204 patent referenced above. Thus, the jukebox devices 16 each preferably include one or more microprocessors, such as a main CPU and an audio DSP, a memory, such

as a hard drive, for storing songs and/or other content, a display of displaying visual items, an audio arrangement 20 for providing audio, a communication system for enabling the jukebox to communicate with the central server 12 through the communications network 14, and operating software, preferably including a multitasking operating system, that controls the operation of the jukebox. The operating software is also preferably updatable through communication with the central server 12 as described, for example, in the '204 patent referenced above. The jukeboxes 16 further include one or more payment devices, such as coin, bill and/or credit card input devices, for enabling a customer to pay for usage of the jukebox device in a convenient manner. The screen 18 is preferably a touch screen that enables the user to input selections by touching the screen.

[0058] In accordance with the invention, each jukebox device has a local server 22 that can be accessed by the jukebox device. The local servers are respectively connected to the jukebox devices using Ethernet or other type of local connection. The local servers 22 each preferably include a mirror copy of the master library of musical recordings maintained by the central server 12. The local server 22 can be loaded with the master library by the entity that owns and/or controls the jukebox network prior to shipping the local server and jukebox device to the jukebox distributor or operator. Of course, over time, the local sever will no longer correspond identically to the central server, due to the fact that the central server is preferably continually updated with additional or new songs. Thus, the local servers 22 are also preferably updated periodically to maintain a correspondence with the library on the central server 12. This updating can be done by the central server 12 through communication with the jukebox devices connected with the local servers 22 using, for example, either dial-up or broadband modems. Alternatively, the updating can be done personally with an update tool that can be connected by a routeman or other person directly to the jukebox or local server for the purpose of updating the contents of the local server. The portable tool could include a removable storage medium, such as a hard drive, that could be returned to and reused by the owner of the jukebox system for future updates. The tool itself could be kept by the operator or other person in charge of maintaining specific jukeboxes for use upon receipt of the updated removable storage medium from the owner of the jukebox system.

[0059] For security reasons, the local server 22 preferably does not include all of the digital data that constitutes any one song that is stored on the local server 22. In addition, the part of the song that is on the local server is encrypted. The jukebox device 16 contains the missing part of each of the songs on the local server, thereby enabling the jukebox to assemble the complete song based on the contents of the local server and the memory on the jukebox device. The missing data located on the jukebox is needed in order to decrypt the



songs. For example, a single block (or other small fraction) of data for each song may be missing on the local server but present on the jukebox device, and the encryption may be based on the missing block and may proceed on a block by block basis. Thus, none of the blocks can be decrypted without obtaining and/or decrypting a preceding block. This feature provides significant security and prevents or deters theft or other type of unauthorized use or copying of the songs on the local server. Thus, in this embodiment, each local server must be specifically assigned to a specific jukebox device so that the decryption described above can be properly performed.

[0060] In accordance with a preferred embodiment of the invention, the local servers are also each individually registered with and identified to the central server 12, so that the central server can individually manage and monitor each local server. The same is true for the jukebox device itself, i.e., it is also preferably registered with the central server so that it too can be individually monitored and managed by the central server. As will be understood from the foregoing description, the local servers become an important and advantageous part of the jukebox system by allowing the contents thereof to be accessed by the jukebox device to provide additional services (such as providing additional songs) not available on the jukebox device itself. As will be explained below, the song library of the central server and/or the storage capacity itself can be advantageously used to provide services to other jukeboxes, such as fee-based residential jukeboxes and/or other coin-operated equipment. One preferred use of the local servers to provide an immediate song downloading feature for the jukebox device will now be described below in detail with reference to the exemplary screen shots of Figures 3-6.

[0061] Figure 3 shows an exemplary screen shot for a music selection screen 30 as displayed on the touch display of the jukebox device. As can be seen in Figure 3, this selection screen, which is preferably the initial selection screen displayed to a customer, includes graphical representations 32 of the various album covers for songs that are stored in the memory of the jukebox device. The album covers are shown in alphabetical order and the virtual slide bar 33 can be used to scroll through the available albums. Up and down arrows (34 and 35) are also provided for stepping through the available albums. A "Now Playing" button 36 is also provided for showing information on the song currently playing on the jukebox (if any). A "Top Ten" button 38 is also provided for showing a list of the ten most popular songs on the jukebox. A "Tune Central" (TM of Touch-Tunes Music Corporation) button 39 is also provided, the function of which will now be described in detail with reference to Figure 4.

[0062] If the user does not see an album of interest in the display of album covers or desires for any reason to search for available songs that are not present on the jukebox device, the user may select the "Tune Central"

button 39. When the "Tune Central" button is pressed, the display on the jukebox is changed from that of Figure 3 to that of Figure 4. The exemplary screen shot of Figure 4 shows a search screen 40 which enables a search to be performed on the local server 22 connected to the jukebox device. This screen 40 provides a virtual keyboard 42 for use in entering a search request. The search can be done by album, artist or song, based on the associated buttons 47. Once a search is typed, the user touches the "Search" button 44 and a search of the contents of the local server is initiated. Input from the virtual keyboard can be cleared using the "Clear" button 46.

[0063] When a search is initiated from screen 40, the screen is changes to that shown in Figure 5 to display the results of the search. As shown in Figure 5, the results of the search are listed. More particularly, in this example, a list of songs that satisfy the search request are listed. The list could also be by album if the search was album based. The user can scroll through the search results using slide bar 53. The user is also shown a display 55 of the number of current credits and a display 56 of the number of credits that are required to download a song from the local server to the jukebox device. The user can go back to the previous screen by touching the "Back" button 57. If the user selects and song from the search list and then touches the "Get It Now" button 54, the jukebox is operable to immediately download the selected song from the local server to the jukebox for play on the jukebox. The downloaded song can be queued up with any other selected but unplayed songs (if any) for play on the Jukebox. In this example, the download costs five credits instead of one credit like a normal selection from the storage of the jukebox itself. Once the downloaded song is played, it is preferably deleted from the jukebox device (together with any graphical data, such as the album cover graphic) that was also downloaded from the local server in connection with the song download). In this way, the user has the option, through use of the "Tune Central" button, to temporarily obtain on the jukebox any song from the master library of recordings without the need to contact the central server 12. As a result, the jukebox provides a more enjoyable experience for the user, while also increasing revenue generated thereby.

[0064] Figure 6 shows another exemplary screen shot of a song selection screen 60 that is displayed when a user touches an album cover graphic from the screen 30 of Figure 3. Thus, this screen shows an alternative (or typical) method of selecting a song, wherein the song is selected directly from the subset of songs that are directly available from the storage device of the jukebox itself (rather than the local server). In this example, Joe Cocker's Greatest Hits was selected from the screen of Figure 3. As shown in Figure 6, the resulting screen display 60 shows the selected album graphic 61 and a list of the songs 62 that are available on the jukebox for that album. The jukebox may or may not include all of the

songs for a particular album. The available songs can be scrolled through if necessary using scroll bars 63a and 63b. The user has the option, through the "Play" button 65, to select a song from the list for play on the jukebox. A "Play Now" button 66 is also provided for enabling the user to select a priority play of the song, thereby giving the song a higher priority than songs selected using the "Play" button 65. This priority feature preferably requires more play credits than the normal play. A display 67 shows the number of credits available for the user. Button 64 shows other albums for the same artist being shown at 61, thereby enabling a user to easily search through the albums for a particular artist for a desired song.

[0065] As also shown in Figure 6, a "Tune Central" button 68 is displayed that enables the user to search for songs by this same artist on the local server as explained in connection with Figure 4. In other words, button 68 takes the user to the search screen 40 of Figure 4 for searching the local server. The user can then proceed to search the local server and select songs therefrom, if desired, as described above in connection with Figures 4 and 5. Thus, as explained above, the user can access the local server at various screens in a convenience and efficient manner, depending on the desires of the user when interacting with the jukebox screen.

[0066] As can be seen from Figures 3-6, the user is provided with the option of playing songs that are resident on the jukebox device itself or, alternatively, selecting songs from the local server for download and play in an efficient and reliable manner, thereby significantly improving the operation of jukebox systems, particularly those that cannot quickly, easily or reliably receive downloads of music on demand from a central server. It is noted that the screen shots of Figures 3-6 are only exemplary and any suitable screen configurations can be used to provide the functionality described herein. In addition, the jukebox operator is provided with the ability through operator screens (not shown) to set filters per genre or style of music in order to limit access to the end user and avoid undesirable music being played at a specific location.

[0067] Figure 7 shows a block diagram of the electronic elements that define the local server 22 in accordance with a preferred embodiment of the instant invention. As shown in Figure 7, the local server 22 includes a CPU 72 (e.g., AMD Elan 100 MHz), a flash memory (e.g., 8MB) containing the BIOS and OS, a pair of master/slave hard drives (82, 84 and 86, 88, respectively), a pair of IDE controllers 78 and 80 for the hard drive pairs respectively, a RAM 76 (e.g., 32MB), an Ethernet controller for controlling communication with the jukebox device 16, and the appropriate buses interconnecting the various elements. Of course, other configurations or arrangements for the local server 22 may be used. A unique identifier may be provided in the local server for enabling the local server to be uniquely identified and registered by the jukebox and/or central serv-

er. The identifier may, for example, be located in the flash memory 74.

[0068] As will be appreciated from the description of the invention above, the addition of the local server significantly enhances the operation of the jukebox devices that are part of a jukebox system. However, the local servers also provide other benefits and features that will now be described.

[0069] The collection of local servers 22 are used as a network of distributed servers that can be controlled by the central server 12 through its associated jukebox device 16 to provide music services to other devices. For example, the local servers and associated jukebox can be used to deliver requested songs to a dedicated residential jukebox device (or other suitable jukebox device) in addition to providing song services to the specific jukebox to which it is connected and assigned. Thus, the network of distributed servers can provide a support network for implementing residential jukeboxes of the type which allow a user to download songs for reproduction and/or storage at a residential location for an appropriate fee. As a result, the jukebox system operator can provide and control commercial jukeboxes and well as residential jukeboxes through the jukebox system. In this embodiment, the jukebox device and/or local server are connected to the Internet (or other suitable network) using a broadband modem and is provided with software that can selectively deliver song files to any dedicated residential jukebox device (also connectable to the Internet) under control of the central server. The central server receives requests from a residential jukebox and, by analyzing traffic on the network, provides instructions to a selected jukebox device to download the requested song file (either from its memory or from the local server) to the residential jukebox for a fee or under a subscription plan for the residential jukebox.

[0070] In accordance with another aspect of the invention, the local server and jukebox device are used, under control of the central server, to provide management services for other types of coin operated or payment triggered equipment, such as gaming devices, installed in the same location as (or in close proximity to) the jukebox. In other words, the jukebox system is preferably used to update the functionality of and/or manage other downloading devices present in the same location. As a result, the jukebox becomes a "central hub" for all downloading equipment in a location. This feature is achieved, in one embodiment, by networking all of the downloading devices in a single location together with the jukebox and local file server. The central server can then download information to the local server together with instructions to the jukebox as to which devices should be updated with what data and/or software. The jukebox device and central server can also be used to collect information from the other downloading devices to which it is managing and upload that information to the central server for reporting/accounting purposes.

Thus, the owner/operator of the jukebox system can act as a third party service provider to other coin-op companies for the purpose of managing and/or updating their equipment.

[0071] The large amounts of memory provided by the local servers and the fact that they are provided and accessible at thousands of locations over a well controlled network, turns the jukebox system into a powerful tool that can be used to perform a variety of functions in the coin-op industry. More and more coin-op manufacturers are going towards games that are software upgradeable through their internal hard drives. These updates are done periodically, but as these devices increase there will be an ever increasing need for a system that can reliably and efficiently perform the updates from a remote location. The jukebox system of the instant invention satisfies this need by enabling all suitable electronic coin-op devices at a jukebox location to be managed by the central server using the jukebox and local server at the location. The central server can download software or data updates, store them on the local server and then dispatch the updates to the intended units of equipment in the establishment. Thus, the jukebox system can act as a third party service provider to other companies in the coin-op business, thereby significantly enhancing the functionality of the jukebox system.

[0072] As an example, there are currently about 140,000 Merit coin-operated countertop devices in the USA, each of which enables users to play games and the like for a fee. Many of these devices operate with a hard drive that can be upgraded with new software. Merit does this by shipping CD-ROMs to operators who then need to drive to each location and manually update each machine. In accordance with the instant invention, however, all suitable coin-op equipment at a location are connected (directly or indirectly) with the local jukebox and local server assigned thereto. This enables the central server to receive the intended software update for any device, together with information that identifies what devices are to be upgraded with what software. The upgrade services are preferably fee based and provide an additional revenue stream for the jukebox system. The central server then downloads the software to the local servers with the upgrade instructions to further download the upgrades to the appropriate device(s).

[0073] As explained above, the local server of the instant invention enables songs to be downloaded to a commercial jukebox to which it is assigned or to residential jukeboxes under control of the central server. In addition, the local servers can be used for an on-premise networked application which manages other coin-op devices. These various features of the instant invention are illustrated in Figure 8.

[0074] Figures 8 shows a block diagram of a complete jukebox system network as contemplated by a preferred embodiment of the instant invention. As explained above, the system includes a central server 12 connected to a communications network 14, a series of com-

mercial jukeboxes 16a, 16b and 16c with associated local music file servers 22a, 22b and 22c, a series of residential jukeboxes 100a, 100b and 100c connected to the network via broadband devices 102a, 102b and 102c, and an on-premise network shown on the right hand side of Figure 8. This on-premise network includes a jukebox device 16d connected via a router or network hub 110 to a local file server 22d, a number of additional coin-op equipment, such as a dart game 104, a golf game 106 and a countertop videogame 108, and a broadband modem 112 connecting this local network to the communications network 14. With this exemplary configuration as shown in Figure 8 all of the functionality described herein can be implemented through the jukebox system of the instant invention.

[0075] While the preferred aspects of the invention have been illustrated and described herein, it will be apparent to one of ordinary skill in the art that various changes and/or modifications can be made. Thus, the specific description herein is meant to be exemplary only and is not intended to limit the invention beyond the terms of appended claims.

## Claims

### 1. A jukebox system comprising:

a central server including a master library of content to be accessed;  
a plurality of jukebox devices (16a-16f) in communication with said central server (12), said jukebox devices (16a-16f) providing access to said central server (12); and  
a plurality of local servers (22a-22f) each being operably coupled to respective ones of said plurality of jukebox devices (16a-16f), and being in substantially close proximity to said respective ones of said plurality of jukebox devices (16a-16f), said local servers (22a-22f) containing content that is not resident on said jukebox devices (16a-16f).

2. The jukebox system according to claim 1, wherein said local servers (22a-22f) are periodically updated independently from said jukebox devices (16a-16f).

3. The jukebox system according to claim 1, wherein said local servers (22a-22f) are updated from the central server via the jukebox device (16a-16f).

4. The jukebox system according to claim 1, wherein content available at the local server (22a-22f) substantially mirrors content available at the central server at a given point in time.

5. The jukebox system according to claim 1, wherein

- said local server (22a-22f) is in communication with a plurality of remote jukebox devices (16a-16f), said local server (22a-22f) operating to selectively deliver content to said remote jukebox devices (16a-16f) under control of the central server (12).
6. The jukebox system according to claim 1, further comprising:
- a plurality of non-jukebox devices operably connected to said local server (22a-22f), said local server operating as a local central hub for managing said plurality of non-jukebox devices.
7. The jukebox system according to claim 1, further comprising:
- at least one non-jukebox device being operably connected to at least one local server (22a-22f), said local server operating to manage said non-jukebox device.
8. The jukebox system according to claim 6 or 7, wherein the non-jukebox devices provide services in exchange for payment by a user.
9. The jukebox system according to claim 1, wherein a collection of selected local servers (22a-22f) are arranged to provide a network of distributed servers operating under the control of the central server via at least one jukebox device (16a-16f) to provide content and/or services to other devices.
10. The jukebox system according to claim 7, wherein said local server (22a-22f) provides management services for equipment that is capable of downloading updated information.
11. The jukebox system according to claim 1, wherein the local server (22a-22f) is connected to its respective jukebox device (16a-16f) via a dedicated high-speed communications connection.
12. The jukebox system according to claim 11, wherein the dedicated high-speed communications connection is an Ethernet network.
13. The jukebox system according to claim 11, wherein the dedicated high-speed communications connection operates at speeds at least as fast as an Ethernet network.
14. The jukebox system according to claim 2, wherein said local server (22a-22f) is updated via an update tool.
15. The jukebox system according to claim 1, wherein content resident on said central server and said jukebox devices (16a-16f) are compressed and encrypted according to a first encryption level.
16. The jukebox system according to claim 15, wherein content resident on said local servers is encrypted with a second layer of encryption.
17. The jukebox system according to claim 16, wherein content residing on said local servers (22a-22f) are missing a predetermined number of bytes, said missing bytes being stored in a respective jukebox (16a-16f) associated with a respective local server (22a-22f), said missing bytes being inserted into content received by a respective jukebox device (16a-16f) from a respective local server (22a-22f).
18. A jukebox system comprising:
- a central server (12);
- a plurality of jukebox devices (16a-16f) in communication with said central server for receiving content and updates from said central server (12); and
- a local server (22a-22f) in communication with at least one of said plurality of jukebox devices (16a-16f), said local server being arranged to provide content to said jukebox device (16a-16f).
19. The jukebox system according to claim 18, wherein said local server (22a-22f) is located in substantially close proximity to said jukebox device (16a-16f) and is connected to said jukebox device via a high-speed communication link.
20. The jukebox system according to claim 18, wherein said content provided by said local server to said jukebox device (16a-16f) is based on selections made by a user operating the jukebox device (16a-16f).
21. The jukebox system according to claim 20, wherein the local server is periodically updated (22a-22f).
22. The jukebox device according to claim 21, wherein the content of the local server (22a-22f) substantially mirrors the content of the central server at a given point in time.
23. The jukebox system according to claim 18, wherein content resident on said central server and said jukebox devices (16a-16f) are compressed and encrypted according to a first encryption level.
24. The jukebox system according to claim 23, wherein content resident on said local servers (22a-22f) is encrypted with a second layer of encryption.

25. The jukebox system according to claim 24, wherein content residing on said local servers (22a-22f) are missing a predetermined number of bytes, said missing bytes being stored in a respective jukebox (16a-16f) associated with a respective local server (22a-22f), said missing bytes being inserted into content received by a respective jukebox device (16a-16f) from a respective local server (22a-22f).
26. A method of operating a jukebox system comprising:
- providing a plurality of services and content at a central repository (12);
  - connecting a plurality of jukebox devices (16a-16f) to said content repository via a communications medium;
  - connecting a local server (22a-22f) to at least one of said plurality of jukebox devices (16a-16f), said local server being in substantially close proximity to said jukebox device (16a-16f) to which it is connected;
  - providing access to content stored on the local server (22a-22f) to a user via the jukebox device (16a-16f);
  - downloading a user selection from the local server (22a-22f) to the jukebox device (16a-16f) automatically or based on user action; and
  - playing or displaying content via the jukebox device (16a-16f).
27. The method according to claim 26, further comprising:
- connecting a plurality of remote jukebox devices (16a-16f) to the at least one local server (22a-22f), said local server operating to selectively deliver content to said remote jukebox devices (16a-16f) under control of the central repository (12).
28. The method according to claim 26, further comprising:
- connecting a plurality of non-jukebox devices to said local server (22a-22f), said local server arranged to operate as a central hub for managing said plurality of non-jukebox devices.
29. The method according to claim 26, further comprising:
- connecting a collection of local servers (22a-22f) to form a network of distributed servers operating under control of the central repository via at least one jukebox device (16a-16f) to provide content to other devices.
30. The method according to claim 26, further comprising:
- compressing content residing on said central server (12), said jukebox devices (16a-16f) and said local servers (22a-22f);
  - encrypting content residing on said central server and said jukebox devices (16a-16f) at a first level of encryption; and
  - encrypting content residing on said local servers (22a-22f) at a second level of encryption.
31. The method according to claim 30, wherein content residing on said local servers are missing a predetermined number of bytes, said missing bytes being stored on respective jukebox devices (16a-16f) associated with respective local servers (22a-22f), the method further comprising:
- inserting missing bytes into content received by a respective jukebox (16a-16f) from a respective local server (22a-22f).
32. The method according to claim 31, wherein said missing bytes are inserted before playing or displaying said content.
33. The method according to claim 31, wherein said missing bytes are inserted in the content during play or display.
34. A jukebox system comprising:
- a central server containing a plurality of compressed content files, said compressed content files being encrypted at a first encryption level; a plurality of jukebox devices (16a-16f) in communication with said central server for receiving content and updates from said central server and containing a plurality of compressed content files encrypted at said first encryption level; and
  - a local server (22a-22f) in communication with at least one of said plurality of jukebox devices (16a-16f), said local server being arranged to provide content to said jukebox device, wherein content residing on said local server is encrypted at a second level of encryption.
35. The jukebox system according to claim 34, wherein content files residing on said local server are missing a predetermined number of bytes, said missing bytes being stored in a respective jukebox (16a-16f) associated with said local server (22a-22f), said missing bytes being inserted into a content file received by said respective jukebox device from a respective local server.

36. The jukebox system according to claim 34, wherein decryption keys unique to each local server (22a-22f) are communicated to a dedicated registered jukebox device (16a-16f).

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37. The jukebox system according to claim 36, wherein the decryption keys are stored in a volatile memory.

38. A method of operating a jukebox system comprising:

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providing a plurality of services and content at a central repository (12), said central repository including compressed content files that are encrypted at a first level of encryption;  
connecting a plurality of jukebox devices (16a-16f) to said content repository via a communications medium, said jukebox devices containing compressed content files that are encrypted at said first level of encryption;  
connecting a local server (22a-22f) to at least one of said plurality of jukebox devices (16a-16f), said local server being in substantially close proximity to said jukebox device to which it is connected, wherein content resident on said local server is encrypted with a second level of encryption;  
providing access to content stored on the local server (22a-22f) to a user via the jukebox device (16a-16f);  
downloading a user selection from the local server (22a-22f) to the jukebox device (16a-16f) based on user action;  
decrypting said user selection at said jukebox device (16a-16f); and  
playing or displaying user selected content via the jukebox device (16a-16f).

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39. The method according to claim 38, wherein encrypted content files residing on said local server (22a-22f) are missing a predetermined number of bytes, said missing bytes being stored on a jukebox device (16a-16f) associated with said local server, the method further comprising:

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inserting missing bytes into a content file received by the associated jukebox from its local server.

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40. The method according to claim 38, wherein decryption keys unique to each local server (22a-22f) are communicated to a dedicated registered jukebox device (16a-16f).

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41. The method according to claim 40, wherein the decryption keys are stored in a volatile memory.

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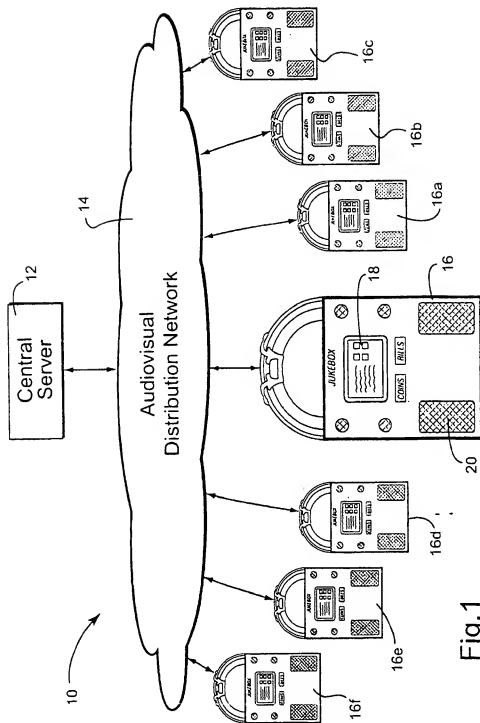
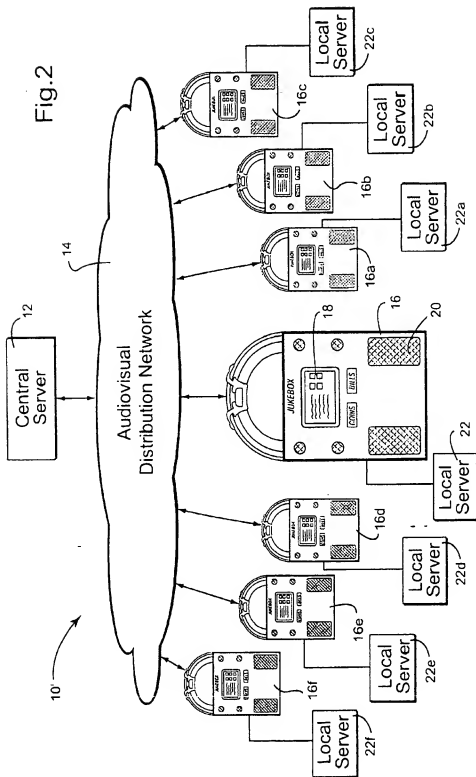


Fig. 1  
(PRIOR ART)

Fig. 2





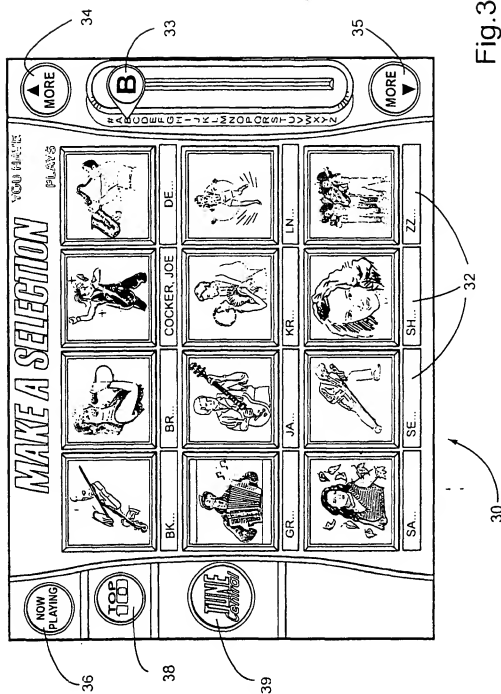


Fig.3

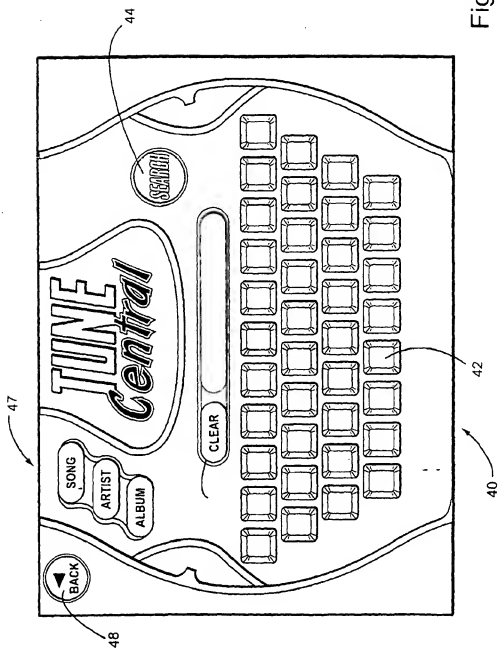


Fig.4

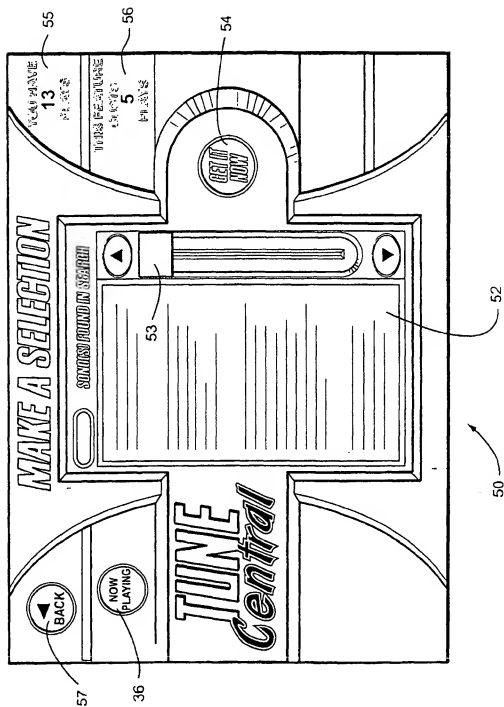


Fig.5

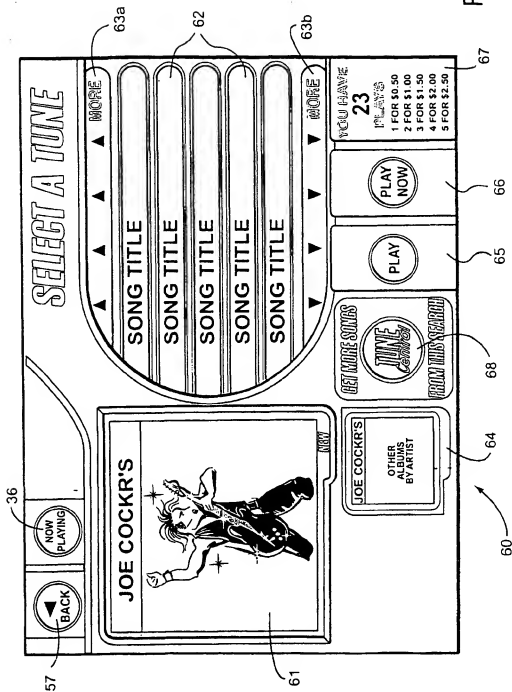


Fig. 6

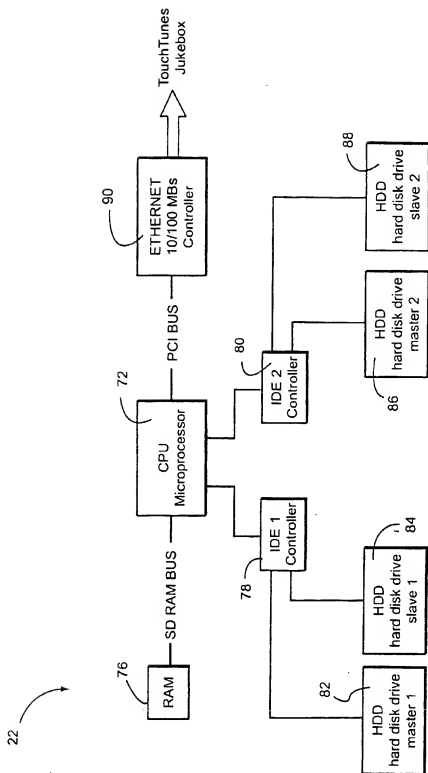


Fig. 7

